Apprenticeship and Industry Training

Ironworker

Apprenticeship Course Outline

4016 (2016)

Alberta Government

Apprenticeship and Industry Training
Alberta Trades. World Ready.

ALBERTA ADVANCED EDUCATION CATALOGUING IN PUBLICATION DATA

Ironworker : apprenticeship course outline

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Ironworker
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Course Outline

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Apprenticeship

Apprenticeship is post-secondary education with a difference. Apprenticeship begins with finding an employer. Employers hire apprentices, pay their wages and provide on-the-job training and work experience. Approximately 80 per cent of an apprentice's time is spent on the job under the supervision of a certified journeyperson or qualified tradesperson. The other 20 per cent involves technical training provided at, or through, a post-secondary institution – usually a college or technical institute.

To become certified journeypersons, apprentices must learn theory and skills, and they must pass examinations. Requirements for certification—including the content and delivery of technical training—are developed and updated by the Alberta Apprenticeship and Industry Training Boaru on the recommendation of Ironworker Provincial Apprenticeship Committee.

The graduate of the Ironworker apprenticeship program is a certified journeyperson who will be able to:

- responsibly do all work tasks expected of a journeyperson
- supervise, train and coach apprentices
- demonstrate the principles of drafting, how drawings originate and how to correctly interpret the information given - the use of each type and the related work orders, materials, lists, etc.
- comply with all applicable Codes and Regulations with reference to materials, its uses and safety
- identify structural shapes, ropes, wire and fibre as it relates to structural and ornamental components
- demonstrate the placement of pre-cast concrete and concrete reinforcement materials to an acceptable level of workmanship
- use hand tools and powered equipment in a proper and safe manner
- perform a satisfactory operation with oxy-fuel or electric arc welding equipment in order to facilitate this work
- co-ordinate iron work with other trades on the job site
- perform assigned tasks in accordance with quality and production standards required by industry

Apprenticeship and Industry Training System

Industry-Driven

Alberta's apprenticeship and industry training system is an industry-driven system that ensures a highly skilled, internationally competitive workforce in more than 50 designated trades and occupations. This workforce supports the economic progress of Alberta and its competitive role in the global market. Industry (employers and employees) establishes training and certification standards and provides direction to the system through an industry committee network and the Alberta Apprenticeship and Industry Training Board. The Alberta government provides the legislative framework and administrative support for the apprenticeship and industry training system.

Alberta Apprenticeship and Industry Training Board

The Alberta Apprenticeship and Industry Training Board provides a leadership role in developing Alberta's highly skilled and trained workforce. The board's primary responsibility is to establish the standards and requirements for training and certification in programs under the Apprenticeship and Industry Training Act. The board also provides advice to the Minister of Advanced Education on the needs of Alberta's labour market for skilled and trained workers, and the designation of trades and occupations.

The thirteen-member board consists of a chair, eight members representing trades and four members representing other industries. There are equal numbers of employer and employee representatives.

Industry Committee Network

Alberta's apprenticeship and industry training system relies on a network of industry committees, including local and provincial apprenticeship committees in the designated trades, and occupational committees in the designated occupations. The network also includes other committees such as provisional committees that are established before the designation of a new trade or occupation comes into effect. All trade committees are composed of equal numbers of employer and employee representatives. The industry committee network is the foundation of Alberta's apprenticeship and industry training system.

Local Apprenticeship Committees (LAC)

Wherever there is activity in a trade, the board can set up a local apprenticeship committee. The board appoints equal numbers of employee and employer representatives for terms of up to three years. The committee appoints a member as presiding officer. Local apprenticeship committees:

- monitor apprenticeship programs and the progress of apprentices in their trade, at the local level
- make recommendations to their trade's provincial apprenticeship committee (PAC) about apprenticeship and certification in their trade
- promote apprenticeship programs and training and the pursuit of careers in their trade
- make recommendations to the board about the appointment of members to their trade's PAC
- help settle certain kinds of disagreements between apprentices and their employers
- carry out functions assigned by their trade's PAC or the board

Provincial Apprenticeship Committees (PAC)

The board establishes a provincial apprenticeship committee for each trade. It appoints an equal number of employer and employee representatives, and, on the PAC's recommendation, a presiding officer - each for a maximum of two terms of up to three years. Most PACs have nine members but can have as many as twenty-one. Provincial apprenticeship committees:

- Make recommendations to the board about:
    - standards and requirements for training and certification in their trade
    - courses and examinations in their trade
    - apprenticeship and certification
    - designation of trades and occupations
    - regulations and orders under the Apprenticeship and Industry Training Act
- monitor the activities of local apprenticeship committees in their trade
- determine whether training of various kinds is equivalent to training provided in an apprenticeship program in their trade
- promote apprenticeship programs and training and the pursuit of careers in their trade
- consult with other committees under the Apprenticeship and Industry Training Act about apprenticeship programs, training and certification and facilitate cooperation between different trades and occupations
- consult with organizations, associations and people who have an interest in their trade and with employers and employees in their trade
- may participate in resolving certain disagreements between employers and employees
- carry out functions assigned by the board

Ironworker PAC Members at the Time of Publication

Mr. S. Papineau	Stony Plain	Presiding Officer
Mr. P. Bichel	Carvel	Employer
Mr. M. Emery	Sherwood Park	Employer
Mr. M. Grenis	Edmonton	Employer
Mr. B. White	Calgary	Employer
Mr. C. Carriere	Calgary	Employee
Mr. O. Cooper	Okotoks	Employee
Mr. C. Porte	Edmonton	Employee
Mr. G. Dellezay	Red Deer	Employee

Alberta Government

Alberta Advanced Education works with industry, employer and employee organizations and technical training providers to:

- facilitate industry's development and maintenance of training and certification standards
- provide registration and counselling services to apprentices and employers
- coordinate technical training in collaboration with training providers
- certify apprentices and others who meet industry standards.

Apprenticeship Safety

Safe working procedures and conditions, incident/injury prevention, and the preservation of health are of primary importance in apprenticeship programs in Alberta. These responsibilities are shared and require the joint efforts of government, employers, employees, apprentices and the public. Therefore, it is imperative that all parties are aware of circumstances that may lead to injury or harm.

Safe learning experiences and healthy environments can be created by controlling the variables and behaviours that may contribute to or cause an incident or injury. By practicing a safe and healthy attitude, everyone can enjoy the benefit of an incident and injury free environment.

Alberta Apprenticeship and Industry Training Board Safety Policy

The Alberta Apprenticeship and Industry Training Board (board) fully supports safe learning and working environments and emphasizes the importance of safety awareness and education throughout apprenticeship training- in both on-the- job training and technical training. The board also recognizes that safety awareness and education begins on the first day of on-the-job training and thereby is the initial and ongoing responsibility of the employer and the apprentice as required under workplace health and safety training. However the board encourages that safe workplace behaviour is modeled not only during on-the-job training but also during all aspects of technical training, in particular, shop or lab instruction. Therefore the board recognizes that safety awareness and training in apprenticeship technical training reinforces, but does not replace, employer safety training that is required under workplace health and safety legislation.

The board has established a policy with respect to safety awareness and training:

> **The board promotes and supports safe workplaces, which embody a culture of safety for all apprentices, employers and employees. Employer required safety training is the responsibility of the employer and the apprentice, as required under legislation other than the *Apprenticeship and Industry Training Act.***

The board's complete document on its 'Apprenticeship Safety Training Policy' is available at www.tradesecrets.alberta.ca; access the website and conduct a search for 'safety training policy'.

Implementation of the policy includes three common safety learning outcomes and objectives for all trade course outlines. These common learning outcomes ensure that each course outline utilizes common language consistent with workplace health and safety terminology. Under the title of 'Standard Workplace Safety', this first section of each trade course outline enables the delivery of generic safety training; technical training providers will provide trade specific examples related to the content delivery of course outline safety training.

Occupational Health and Safety

A tradesperson is often exposed to more hazards than any other person in the work force and therefore should be familiar with and apply the Occupational Health and Safety Act, Regulations and Code when dealing with personal safety and the special safety rules that apply to all daily tasks.

Occupational Health and Safety (a division of Alberta Human Services) conducts periodic inspections of workplaces to ensure that safety regulations for industry are being observed.

Additional information is available at www.humanservices.alberta.ca

Technical Training

Apprenticeship technical training is delivered by the technical institutes and colleges in the public post-secondary system throughout Alberta. The colleges and institutes are committed to delivering the technical training component of Alberta apprenticeship programs in a safe, efficient and effective manner. All training providers place a strong emphasis on safety that complements safe workplace practices towards the development of a culture of safety for all trades.

The technical institutes and colleges work with Alberta's Apprenticeship and Industry Training Board, industry committees and Alberta Advanced Education to enhance access and responsiveness to industry needs through the delivery of the technical training component of apprenticeship programs across the Province. They develop curriculum from the course outlines established by industry and provide technical training to apprentices.

The following institutions deliver Ironworker apprenticeship technical training:

Northern Alberta Institute of Technology Southern Alberta Institute of Technology

Procedures for Recommending Revisions to the Course Outline

Advanced Education has prepared this course outline in partnership with the Ironworker Provincial Apprenticeship Committee.

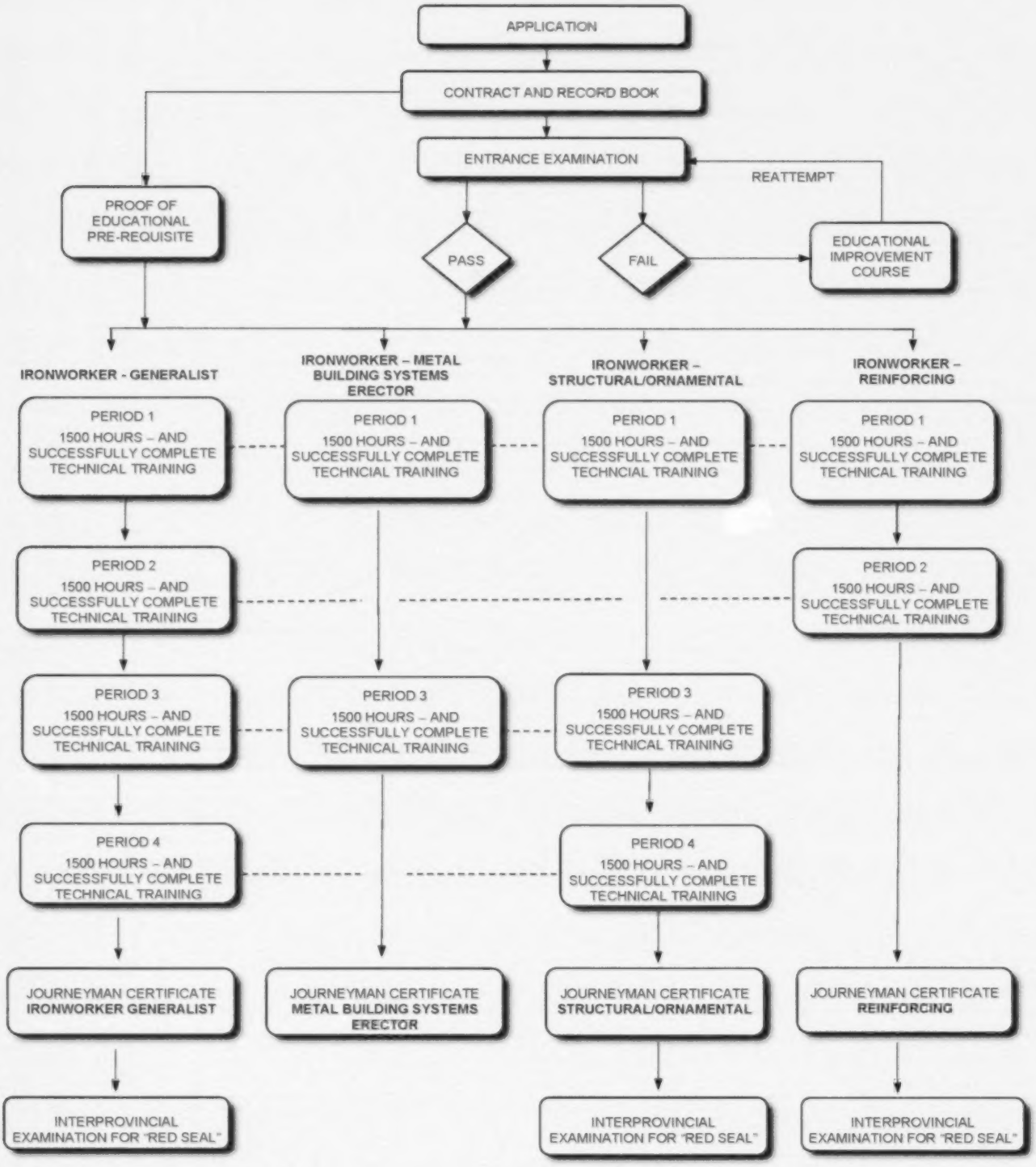
This course outline was approved on December 18, 2015 by the Alberta Apprenticeship and Industry Training Board on a recommendation from the Provincial Apprenticeship Committee. The valuable input provided by representatives of industry and the institutions that provide the technical training is acknowledged.

Any concerned individual or group in the province of Alberta may make recommendations for change by writing to:

Ironworker Provincial Apprenticeship Committee
c/o Industry Programs and Standards
Apprenticeship and Industry Training
Advanced Education
10th floor, Commerce Place
10155 102 Street NW
Edmonton AB T5J 4L5

It is requested that recommendations for change refer to specific areas and state references used. Recommendations for change will be placed on the agenda for regular meetings of the Ironworker Provincial Apprenticeship Committee.

Apprenticeship Route toward Certification


APPLICATION
CONTRACT AND RECORD BOOK
ENTRANCE EXAMINATION
REATTEMPT
PROOF OF EDUCATIONAL PRE-REQUISITE
PASS
FAIL
EDUCATIONAL IMPROVEMENT COURSE
IRONWORKER - GENERALIST
IRONWORKER – METAL BUILDING SYSTEMS ERECTOR
IRONWORKER – STRUCTURAL/ORNAMENTAL
IRONWORKER – REINFORCING
PERIOD 1
1500 HOURS – AND SUCCESSFULLY COMPLETE TECHNICAL TRAINING
PERIOD 1
1500 HOURS – AND SUCCESSFULLY COMPLETE TECHNCIAL TRAINING
PERIOD 1
1500 HOURS – AND SUCCESSFULLY COMPLETE TECHNCIAL TRAINING
PERIOD 1
1500 HOURS – AND SUCCESSFULLY COMPLETE TECHNICAL TRAINING
PERIOD 2
1500 HOURS – AND SUCCESSFULLY COMPLETE TECHNICAL TRAINING
PERIOD 2
1500 HOURS – AND SUCCESSFULLY COMPLETE TECHNICAL TRAINING
PERIOD 3
1500 HOURS – AND SUCCESSFULLY COMPLETE TECHNICAL TRAINING
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1500 HOURS – AND SUCCESSFULLY COMPLETE TECHNICAL TRAINING
PERIOD 3
1500 HOURS – AND SUCCESSFULLY COMPLETE TECHNICAL TRAINING
PERIOD 4
1500 HOURS – AND SUCCESSFULLY COMPLETE TECHNICAL TRAINING
PERIOD 4
1500 HOURS – AND SUCCESSFULLY COMPLETE TECHNICAL TRAINING
JOURNEYMAN CERTIFICATE IRONWORKER GENERALIST
JOURNEYMAN CERTIFICATE METAL BUILDING SYSTEMS ERECTOR
JOURNEYMAN CERTIFICATE STRUCTURAL/ORNAMENTAL
JOURNEYMAN CERTIFICATE REINFORCING
INTERPROVINCIAL EXAMINATION FOR "RED SEAL"
INTERPROVINCIAL EXAMINATION FOR "RED SEAL"
INTERPROVINCIAL EXAMINATION FOR "RED SEAL"

Ironworker Training Profile
FIRST PERIOD
(6 Weeks 30 Hours per Week – Total of 180 Hours)

SECTION ONE	**A**	**B**	**C**	
STANDARD WORKPLACE SAFETY **18 HOURS** ⇨	Safety Legislation, Regulations & Industry Policy in the Trades 2 Hours	Climbing, Lifting, Rigging and Hoisting 2 Hours	Hazardous Materials & Fire Protection 2 Hours	
	D	**E**		
	Apprenticeship Training Program 6 Hours	Safety 6 Hours		
SECTION TWO	**A**	**B**		
MATH AND DRAWING INTERPRETATION **42 HOURS** ⇨	Mathematics 24 Hours	Drawings 18 Hours		
SECTION THREE	**A**	**B**	**C**	
RIGGING **66 HOURS** ⇨	Rigging and Hoisting 36 Hours	Hand and Power Tools 18 Hours	Scaffolding, Swing Stage 12 Hours	
SECTION FOUR	**A**			
OXY-FUEL EQUIPMENT **54 HOURS** ⇨	Oxy-Fuel Cutting Equipment 54 Hours			

SECOND PERIOD
(6 Weeks 30 Hours per Week – Total of 180 Hours)

SECTION ONE

REINFORCING STEEL AND POST TENSIONING
54 HOURS

A	B
Reinforcing Steel Drawings 36 Hours	Post-Tensioning Drawings 18 Hours

SECTION TWO

REINFORCED CONCRETE
126 HOURS

A	B	C
Concrete 12 Hours	Quality Control 2 Hours	Post-Tensioning 24 Hours

D	E
Reinforcing Steel 82 Hours	Estimating for Reinforcing 6 Hours

THIRD PERIOD
(6 Weeks 30 Hours per Week – Total 180 Hours)

SECTION ONE

STRUCTURAL AND ORNAMENTAL DRAWING INTERPRETATION AND MATHEMATICS
46 HOURS

A	B	C
Structural Steel Drawings 18 Hours	Drawing Interpretation and Mathematics 22 Hours	Estimating for Structural-Ornamental 6 Hours

SECTION TWO

STRUCTURAL AND ORNAMENTAL RIGGING
60 HOURS

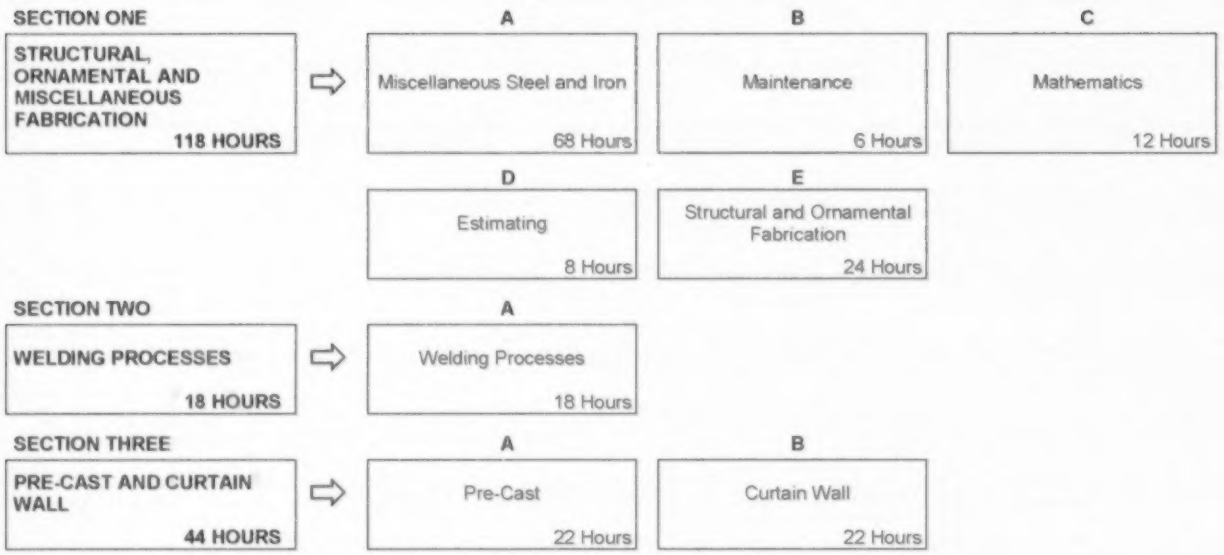
A
Structural Steel Erection 60 Hours

SECTION THREE

STRUCTURAL STEEL AND METAL BUILDING SYSTEMS
74 HOURS

A	B	C
Shielded Metal Arc Welding (SMAW) 18 Hours	Metal Building Systems 50 Hours	Steel Structure Mobility 6 Hours

FOURTH PERIOD
(6 Weeks 30 hours per Week – Total 180 Hours)



NOTE: The hours stated are for guidance and should be adhered to as closely as possible. However, adjustments must be made for rate of apprentice learning, statutory holidays, registration and examinations for the training establishment and Apprenticeship and Industry Training.

FIRST PERIOD TECHNICAL TRAINING
IRONWORKER TRADE
COURSE OUTLINE

UPON SUCCESSFUL COMPLETION OF THIS PROGRAM THE APPRENTICE SHOULD BE ABLE TO PERFORM THE FOLLOWING OUTCOMES AND OBJECTIVES.

SECTION ONE:..... STANDARD WORKPLACE SAFETY ..... 18 HOURS

A. Safety Legislation, Regulations & Industry Policy in the Trades ..... 2 Hours

Outcome: ***Describe legislation, regulations and practices intended to ensure a safe work place in this trade.***

1. Demonstrate the ability to apply the Occupational Health and Safety Act, Regulation and Code.
2. Explain the role of the employer and employee in regard to Occupational Health and Safety (OH&S) regulations, Worksite Hazardous Materials Information Systems (WHMIS), fire regulations, Workers Compensation Board regulations, and related advisory bodies and agencies.
3. Explain industry practices for hazard assessment and control procedures.
4. Describe the responsibilities of workers and employers to apply emergency procedures.
5. Describe positive tradesperson attitudes with respect to housekeeping, personal protective equipment and emergency procedures.
6. Describe the roles and responsibilities of employers and employees with respect to the selection and use of personal protective equipment (PPE).
7. Select, use and maintain appropriate PPE for worksite applications.

B. Climbing, Lifting, Rigging and Hoisting ..... 2 Hours

Outcome: ***Describe the use of personal protective equipment (PPE) and safe practices for climbing, lifting, rigging and hoisting in this trade.***

1. Select, use and maintain specialized PPE for climbing, lifting and load moving equipment.
2. Describe manual lifting procedures using correct body mechanics.
3. Describe rigging hardware and the safety factor associated with each item.
4. Select the correct equipment for rigging typical loads.
5. Describe hoisting and load moving procedures.

C. Hazardous Materials & Fire Protection ..... 2 Hours

Outcome: ***Describe the safety practices for hazardous materials and fire protection in this trade.***

1. Describe the roles, responsibilities features and practices related to the workplace hazardous materials information system (WHMIS) program.
2. Describe the three key elements of WHMIS.
3. Describe handling, storing and transporting procedures when dealing with hazardous material.
4. Describe safe venting procedures when working with hazardous materials.
5. Describe fire hazards, classes, procedures and equipment related to fire protection.

D. Apprenticeship Training Program ..... 6 Hours

Outcome: ***Manage an apprenticeship to earn journeyman certification.***

1. Describe the contractual responsibilities of the apprentice, employer and Alberta Apprenticeship and Industry Training.
2. Describe the purpose of the apprentice record book.
3. Describe the procedure for changing employers during an active apprenticeship.
4. Describe the purpose of the course outline.
5. Describe the procedure for progressing through an apprenticeship.
6. Describe advancement opportunities in this trade.

E. Safety ..... 6 Hours

Outcome: ***Apply general safe work practices.***

1. Identify causes of accidents in the work environment.
2. Explain the safety regulations for safe work practices in the trade.

SECTION TWO: ..... MATH AND DRAWING INTERPRETATION ..... 42 HOURS

A. Mathematics ..... 24 Hours

Outcome: ***Solve problems using trade math.***

1. Identify terms and equations used with fractions.
2. Use practical fractions with a tape measure.
3. Solve problems using whole numbers and fractions in practical applications.
4. Identify terms and equations used with decimal fractions.
5. Convert fractions to decimals.
6. Convert between fractions, decimals and percentages.
7. Calculate ratio and proportions.
8. Convert units of measurement.
9. Calculate perimeter, area, volume and weight.

B. Drawings ..... 18 Hours

Outcome: ***Interpret drawings.***

1. Identify the types and components of drawings
2. Sketch objects.
3. Explain the relationship of drawings, specifications and standards.

SECTION THREE: ..... RIGGING ..... 66 HOURS

A. Rigging and Hoisting ..... 36 Hours

Outcome: Demonstrate rigging and hoisting techniques.

1. Describe engine[illegible] lifts.
2. Describe manual and power assisted hoisting devices.
3. Describe crane types.
4. Describe material handling equipment.
5. Describe fibre ropes, wire ropes and fittings.
6. Demonstrate the use of knots and hitches.
7. Describe slings and accessories.
8. Explain the formulas and calculations for rigging.
9. Demonstrate the inspection and handling of rigging.
10. Demonstrate the application of slings, hitches, knots and tag lines used for rigging.
11. Communicate using signals.
12. Interpret load charts.

B. Hand and Power Tools ..... 18 Hours

Outcome: Use hand and power tools.

1. Use of tools and accessories.
2. Use layout and measurement tools.
3. Use levelling instruments.

C. Scaffolding, Swing Stage ..... 12 Hours

Outcome: Apply safe work practices with scaffolding systems and elevated work platforms.

1. Describe scaffold systems and structures.
2. Describe elevated work platforms, personnel lifts.

SECTION FOUR: ..... OXY-FUEL EQUIPMENT ..... 54 HOURS

A. Oxy-Fuel Cutting Equipment ..... 54 Hours

Outcome: Use oxy-fuel cutting equipment.

1. Define hazards associated with oxy-fuel cutting equipment.
2. Explain the procedure for handling, transporting and storing cylinders.
3. Describe oxy-fuel equipment and accessories.
4. Maintain oxy-fuel equipment and accessories.
5. Demonstrate start-up, operating and shut-down procedures of oxy-fuel equipment.

SECOND PERIOD TECHNICAL TRAINING
IRONWORKER TRADE
COURSE OUTLINE

UPON SUCCESSFUL COMPLETION OF THIS PROGRAM THE APPRENTICE SHOULD BE ABLE TO PERFORM THE FOLLOWING OUTCOMES AND OBJECTIVES.

SECTION ONE:.....REINFORCING STEEL AND POST-TENSIONING..... 54 HOURS

A. Reinforcing Steel Drawings.....36 Hours

Outcome: ***Interpret reinforcing steel drawings.***

1. Identify types of reinforcing steel drawings.
2. Identify the concrete components from structural engineering and reinforcing steel placing drawings.
3. Interpret schedules from a structural engineering drawing.

B. Post-Tensioning Drawings .....18 Hours

Outcome: ***Interpret post-tensioning drawings.***

1. Identify types, details and systems on post-tensioning drawings.
2. Document stressing data and elongations from post-tensioning drawings.

SECTION TWO: .....REINFORCED CONCRETE ..... 126 HOURS

A. Concrete .....12 Hours

Outcome: ***Interpret the characteristics of reinforced concrete.***

1. Describe the types of concrete and its uses.
2. Describe grouts and their applications.
3. Identify stresses in reinforced concrete.

B. Quality Control.....2 Hours

Outcome: ***Apply quality control practices and procedures.***

1. Explain quality assurance.
2. Interpret standards, codes, specifications and procedures.
3. Complete Quality Control Inspection.

C. Post-Tensioning.....24 Hours

Outcome: ***Install post-tensioning.***

1. Define post-tensioning systems.
2. Review safety aspects of stressing.
3. Explain the applications of pre-stressing.
4. Explain the procedures in tendon placement.
5. Explain the procedures in placing anchor zone reinforcing.

D. Reinforcing Steel ..... 82 Hours

Outcome: ***Install reinforcing materials.***

1. Describe reinforcing steel and mil standards.
2. Describe fabrication methods.
3. Use bending and cutting equipment.
4. Explain the placing codes and standards of reinforcing steel.
5. Demonstrate the reinforcing steel ties required for placing reinforcing steel.
6. Identify reinforcing steel splicing.
7. Identify placing tools.
8. Describe reinforcing steel supports and accessories.
9. Demonstrate the safety precautions of unloading and placing reinforcing steel.
10. Calculate the weights of reinforcing steel.
11. Install specialty reinforcing materials.
12. Pre-fabricate reinforcing components.
13. Create a lift plan for a reinforced project.
14. Rig pre-fabricated reinforcing steel components.

E. Estimating for Reinforcing ..... 6 Hours

Outcome: ***Estimate labour and material requirements for reinforcing projects.***

1. Interpret manpower, material and accessories requirements from reinforcing drawings and specifications.

THIRD PERIOD TECHNICAL TRAINING
IRONWORKER TRADE
COURSE OUTLINE

UPON SUCCESSFUL COMPLETION OF THIS PROGRAM THE APPRENTICE SHOULD BE ABLE TO PERFORM THE FOLLOWING OUTCOMES AND OBJECTIVES.

SECTION ONE:..... STRUCTRUAL AND ORNAMENTAL ..... 46 HOURS
DRAWING INTERPRETATION AND MATHEMATICS

A. Structural Steel Drawings.....18 Hours

Outcome: ***Interpret structural steel drawings.***

1. Identify types of structural steel drawings.
2. Identify the components from structural drawings.
3. Interpret schedules from structural drawings.
4. Coordinate project drawings.

B. Drawing Interpretation and Mathematics.....22 Hours

Outcome: ***Apply mathematics to drawings.***

1. Describe and layout slopes.
2. Solve problems between distance and angles.
3. Demonstrate ability to use formulas to solve given problems.

C. Estimating for Structural/Ornamental .....6 Hours

Outcome: ***Estimate labour and material requirements for metal building systems and miscellaneous projects.***

1. Interpret manpower, material and accessories requirements from structural drawings and specifications.
2. Estimate manpower, material, accessories requirements.

SECTION TWO:.....STRUCTURAL AND ORNAMENTAL RIGGING ..... 60 HOURS

A. Structural Steel Erection.....60 Hours

Outcome: ***Install structural steel components.***

1. Perform calculations with rigging formulas.
2. Determine rigging for pre-cast and structural erection.
3. Demonstrate rigging and reeving procedures.
4. Analyze project drawings and erection procedures.
5. Verify site survey.
6. Describe structural components.
7. Construct structural components.
8. Create a lift plan for a structural project.
9. Review erection and maintenance procedures for specialty structures.

SECTION THREE: ..... STRUCTURAL STEEL AND METAL BUILDING SYTEMS..... 74 HOURS

A. Shielded Metal Arc Welding (SMAW)..... 18 Hours

Outcome: ***Use SMAW welding equipment.***

1. Describe electricity as it relates to welding.
2. Identify mild steel welding electrodes.
3. Explain static and dynamic loading.
4. Identify types of welds, weld faults, joints and symbols.

B. Metal Building Systems ..... 50 Hours

Outcome: ***Erect metal building systems.***

1. Describe metal building systems and building envelope.
2. Analyze project drawings and erection procedures.
3. Verify site survey.
4. Estimate manpower, material, accessories requirements.

C. Steel Structure Mobility ..... 6 Hours

Outcome: ***Use techniques for walking steel beams and column climbing.***

1. Demonstrate the ability to manoeuver at heights.
2. Demonstrate the techniques to climb a vertical member.

FOURTH PERIOD TECHNICAL TRAINING
IRONWORKER TRADE
COURSE OUTLINE

UPON SUCCESSFUL COMPLETION OF THIS PROGRAM THE APPRENTICE SHOULD BE ABLE TO PERFORM THE FOLLOWING OUTCOMES AND OBJECTIVES.

SECTION ONE:.....STRUCTURAL, ORNAMENTAL AND MISCELLANEOUS FABRICATION..... 118 HOURS

A. Miscellaneous Steel and Iron ..... 68 Hours

Outcome: ***Install miscellaneous steel and iron.***

1. Describe ornamental iron and finishes.
2. Describe the sub framing and steel supports.
3. Describe the procedures for installing miscellaneous steel and iron.
4. Fabricate miscellaneous steel and iron.

B. Maintenance ..... 6 Hours

Outcome: ***Perform maintenance, upgrading and repairs.***

1. Dismantle structural, mechanical and miscellaneous components.
2. Repair components.

C. Mathematics ..... 12 Hours

Outcome: ***Apply trigonometry to fabricate and install miscellaneous components.***

1. Solve trigonometry problems using trade math.

D. Estimating ..... 8 Hours

Outcome: ***Estimate labour and material requirements for structural and miscellaneous projects.***

1. Interpret manpower, material and accessories requirements from structural drawings and specifications.
2. Estimate manpower, material, accessories requirements.

E. Structural and Ornamental Fabrication ..... 24 Hours

Outcome: ***Construct a project.***

1. Apply pattern development and layout techniques.
2. Use of cutting and welding equipment.
3. Complete a project from a drawing.

SECTION TWO: ..... WELDING PROCESSES ..... 18 HOURS

A. Welding Processes ..... 18 Hours

Outcome: ***Use welding equipment.***

1. Identify mild steel welding processes.
2. Apply welding procedures to shop projects.

SECTION THREE: ..... PRE-CAST AND CURTAIN WALL ..... 44 HOURS

A. Pre-Cast ..... 22 Hours

Outcome: ***Install pre-cast systems.***

1. Demonstrate the safety precautions of loading and unloading.
2. Layout pre-cast components.
3. Describe sequence of erection.
4. Identify securing procedures.
5. Demonstrate erection procedures.

B. Curtain Wall ..... 22 Hours

Outcome: ***Install curtain wall systems.***

1. Interpret curtain wall drawings.
2. Layout curtain walls.
3. Assemble curtain walls.

Apprenticeship and Industry Training

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